LUNAR–CYCLICAL RAINFALL IN THE NORTHERN TEMPERATE ZONE.

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(Read before the American Philosophical Society, Nov. 1, 1872.)

My discussions of lunar-monthly rainfall, (*ante*, x., 439, 533 ; xi., 203 ; xii.. 179, 523,) embracing observations in Europe, Asia and America, near eastern and western shores of oceans, in regions of monsoons and return trade-winds, near equatorial and polar currents, seem to be sufficiently varied in their character to justify a first approximation to the normal curve for the Northern Temperate Zone. The stations are so well distributed that the influence of local "establishments" must be, to a great extent, eliminated, and it seems reasonable to presume that the residuals represent, with some degree of accuracy, the precipitation which is occasioned by the lunar modifications of the average atmospheric currents. I have given equal weight to the normals for each station, but as the Toronto observations cover only nine years, and those at Chiswick are of the same general character as those at Surrey, I give two complete aggregates : A., embracing stations 2 to 6 inclusive, and B., 2 to 8 inclusive ; and one partial aggregate, C., for all the stations.

NORMALS OF LUNAR–MONTHLY RAINFALL.

Lunar Day.	Mussoorie, 13 years.	Philadelphia, 40 years.	Surrey, 40 years.	Providence, 30 years.	San Francisco, 23 years.	Lisbon, 16 years.	Aggregate A.	Chiswick, 40 years.	Toronto, 9 years.	Aggregate B.	Aggregate C.
1	86	93	100	104	97	104	498	104	93	695	781
2		93	98	100	97	103	491	105	104	700	
3		96	97	98	94	98	483	105	103	691	
4		100	100	98	92	91	481	105	94	680	
5		101	102	100	96	86	485	103	92	680	
6		99	102	103	104	81	489	100	100	689	
7		97	100	107	107	81	492	96	113	701	
8	115	97	101	107	108	85	498	97	117	712	827
9		97	105	101	107	91	501	102	110	713	
10		98	107	93	103	94	495	106	98	699	
11		98	104	87	97	110	496	105	91	692	
12		97	101	85	99	123	505	103	95	703	
13		95	98	87	110	128	518	101	105	724	
14		92	97	90	125	123	527	98	110	735	
15		89	98	90	138	116	531	98	104	733	
16	86	91	98	89	134	114	526	98	91	715	801
17		99	97	93	115	118	522	96	85	703	
18		109	96	99	105	127	536	93	90	719	
19		116	97	104	104	131	552	95	102	749	
20		117	99	108	96	123	543	102	110	755	
21		112	103	111	85	104	515	109	110	734	
22		107	104	110	83	82	486	108	104	698	
23	113	105	101	106	86	69	467	101	103	671	784
24		105	98	102	88	70	463	95	106	664	
25		102	99	99	89	77	466	93	108	667	
26		98	101	99	86	84	468	94	106	668	
27		100	100	103	81	89	473	94	101	668	
28		103	99	109	85	95	491	96	91	677	
29		100	100	111	93	99	503	98	81	682	
30		95	101	108	96	102	502	101	82	685	

Each of the complete aggregates indicates an excess of rainfall during

the half-month of lunar opposition ; a pretty regular increase of rain from the first octant, when the moon is on the meridian at the time of greatest solar heat, until nearly the fifth octant, when her direct meridional influence is exerted at the time of morning low barometer ; average rain when that influence is felt at sunset, or at the morning barometric maximum ; a principal maximum, near the morning barometric minimum, and a principal minimum near sunrise, when the nocturnal precipitation is over ; other minima soon after sunset, after the maximum heat of the day, and after midnight. These features all seem so natural and so simply explicable, that I am unable to regard them as other than typical.

I regret that Mr. Hennessey's observations at Mussoorie were communicated only for the days of quarterly change. They appear to indicate a curve still more strikingly similar to that of the solar-hourly rainfall, and the indication is corroborated by their influence on the general aggregates, as shown in Aggregate C.

It would be possible, even with the data now at my command, to form interesting approximations to the normal lunar curves for each calendar month, but I prefer to wait for observations from a much larger number of stations, before undertaking any more minute calculations than I have embodied in the accompanying table. Even these normals may be employed in connection with barometric and thermometric normals in the study of weather changes ; provided such allowances are made as are obviously required, for the blending of currents over or near the great Lakes, the Gulf, and the ocean. Such limited use of them as I have already made, has strengthened my conviction that the day is not far distant when the normal lunar influence will be ranked among the important elements for calculating the disturbances, and the tendencies towards equilibrium, which determine all meteorological fluctuations, and render satisfactory forecasts practicable.

Stated Meeting, November 1, 1872.

Present, 16 members.

Vice-President, Mr. FRALEY, in the Chair.

The Rev. Mr. Nichols, a newly elected member, was presented to the presiding officer and took his seat.

A circular letter in reference to a new table of logarithms was received from Mr. Ed. Sang, dated No. 2 George street, Edinborough, Oct. 15th, 1872.

A letter was received from Dr. William Elder, addressed to the Curators, dated No. 1824 Mount Vernon Street, Philadelphia, Oct. 31st, 1872. On motion the Curators were